REMARKS

In the Final Office Action, claims 1-8 and 10-27 were rejected. By the present Response, claims 1, 14, 24, 25, 26 and 27 are amended. In addition claim 6 was amended to incorporate minor corrections. Upon entry of the amendments, claims 1-8 and 10-27 will remain pending in the present patent application. Reconsideration and allowance of all pending claims are requested.

Rejections Under 35 U.S.C. § 112

Claims 1-8, 10-13 and 24 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the 35 U.S.C. §112, written description requirement. Applicant has amended claims 1 and 24 to overcome the rejection under 35 U.S.C. § 112. Support for the amended claims can be found at page 13, lines 3-5, in the specification. In view of the amendments to claims 1 and 24, Applicant believes that all grounds of the 35 U.S.C. §112, first paragraph rejection have been obviated. Claims 2-8 and 10-13 are allowable by virtue of their dependency from allowable base claims 1 and 24, as well as for the subject matter they separately recite. Accordingly, Applicant requests that the Examiner reconsider and remove the §112, first paragraph rejection of claims 1-8, 10-13 and 24.

Rejections Under 35 U.S.C. § 102

Claims 1-8 and 10-27 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,426,988 B2 (hereinafter "Yamada"). Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration.

Claims 8 and 10-13

Independent claim 1 was rejected as anticipated by Yamada. Claim 1 recites a method for reducing artifacts in image data generated by a computed tomography system, the artifacts being due to the presence of a high-density object in a subject of interest. The method comprises receiving measured sinogram data from the computed tomography system. The sinogram data is representative of a plurality of sinogram elements. The

method further comprises reconstructing the measured sinogram data to generate initial reconstructed image data and generating corrected sinogram data using the measured sinogram data. Then, the method comprises iteratively reconstructing the corrected sinogram data to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, throughout the iterative reconstruction.

The Examiner indicated that similar steps (prior to the present amendment) were present in Yamada. However, Yamada does not anticipate the method of claim 1 for at least the reasons set forth below.

Claim 1 has been amended by this response. The amendment adds that the corrected sinogram data is iteratively reconstructed to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, throughout the iterative reconstruction. At least these recitations are not taught by Yamada.

Yamada discloses an image processing method for obtaining a fault image, by reconstructing image data obtained by an X-ray CT. The method comprises obtaining measured projection data, reconstructing an initial image, and setting an estimated image with a predetermined value. A high-absorber area is then set based on the initial image. Estimated projection data is then derived, as are a comparison reference image and a weighted comparison reference image. The estimated image is then overwritten by the weighted comparison reference image. The measured sinogram data at a portion where the X-rays pass through the high-absorber area is then replaced with data according to the

overwritten estimated projection data to correct the measured projection data. Finally, an image of the corrected measured projection data is reconstructed to derive the fault image.

The Examiner contended that Yamada discloses assigning a weight measure to each sinogram element in the corrected sinogram data, wherein the weight measure is derived based on the measured sinogram data. However, Applicant points out that the reference does not disclose that the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data.

Further, Applicant points out that the weighting of the comparison reference image in Yamada is based on the length of the path through which X-rays pass in the high-absorber region. Specifically, at column 14, line 65 – column 15, line 18, Yamada states:

> According to a length of the path through which X-ray passes in the high-absorber, weighting of the comparison reference image d 0 is carried out to derive a weighted comparison reference image e 0. When the weighting of the comparison reference image d 0 is carried out, the comparison reference image d 0 read out from the comparison reference image memory portion 23 is weighted by the weighting operation portion 15. The weighted comparison reference image e 0 is written in the comparison reference image memory portion 23. The derivation of the weighted comparison reference image e 0 corresponds to a weighted comparison reference image derivation process of the present invention. Next, derivation of the weighted comparison reference image e 0 is explained together with the weighted ART/EM method.
>
> In order to carry out weighting for an artifact portion, a weight function W(L) is introduced as shown in FIG. 7 (b). The weight function W(L) is a function with respect to a length L of a path through which X-ray passes in the high-absorber. The relationship between a position of the path and a weight is shown in FIG. 7(a).

Clearly, Yamada does not disclose that the weight measure associated with each sinogram element corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data.

In addition, any iterative correction of the projection data, if performed by Yamada at all, is based on subjecting the corrected projection data to the reconstruction process at the comparison reference image operating portion, the weighing operation portion and the fault image overwriting portion to obtain the final corrected image. In other words, the weight measure in Yamada is derived from the measured sinogram data *only in the first iteration*. Each subsequent iteration of the reconstruction process in Yamada uses the weight measure obtained at the weighted comparison reference image step as a basis to derive the weight measure to be used in the next iteration. Therefore, the weight measure used in the reconstruction process evolves with each iteration of the reconstruction process. In accordance with claim 1, the corrected sinogram data is iteratively reconstructed based on the weight measure associated with each sinogram element, *throughout the iterative reconstruction.*

Because Yamada does not disclose at least (1) that the corrected sinogram data is iteratively reconstructed to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, and (2) that the corrected sinogram data is iteratively reconstructed based on the weight measure associated with each sinogram element, throughout the iterative reconstruction, the reference cannot anticipate claim 1. Accordingly, Yamada cannot support a *prima facie* case of anticipation of claim 1. Accordingly, claim 1 and the claims depending therefrom are believed to be clearly patentable over Yamada as well as other prior art of record.

Claims 14-23

Independent claim 14 was similarly rejected as anticipated by Yamada. Claim 14 recites a method for reducing artifacts in image data generated by a computed tomography system. The artifacts are due to the presence of a high density object in a subject of interest. The method comprises receiving measured sinogram data from the computed tomography system. The sinogram data is representative of a plurality of sinogram elements. The method further comprises reconstructing the measured sinogram data to generate initial reconstructed image data and generating corrected sinogram data using the measured sinogram data. Then, the method comprises assigning a weight measure to each sinogram element in the corrected sinogram data, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data. Then, the method comprises iteratively reconstructing the corrected sinogram data to generate improved reconstructed image data based on the weight measure, throughout the iterative reconstruction.

Claim 14 has been amended by this response. The amendment adds that the corrected sinogram data is iteratively reconstructed to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, throughout the iterative reconstruction.

As discussed with respect to claim 1 above, Yamada does not disclose that the corrected sinogram data is iteratively reconstructed to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, and that the corrected sinogram data is iteratively reconstructed based on

the weight measure associated with each sinogram element, throughout the iterative reconstruction.

Because Yamada does not disclose at least these recitations, Yamada cannot support a *prima facie* case of anticipation of claim 14. Accordingly, claim 14 and the claims depending therefrom are believed to be clearly patentable over Yamada as well as other prior art of record.

Claims 24 and 27

Independent claims 24 and 27 were similarly rejected as anticipated by Yamada. Claims 24 and 27 recite a computed tomography system for reducing artifacts in image data. The artifacts are due to the presence of a high density object in a subject of interest. The system comprises an X-ray source configured to project an X-ray beam from a plurality of positions through the subject of interest and a detector configured to produce a plurality of electrical signals corresponding to the X-ray beam. The system further comprises a processor configured to process the electrical signals to generate measured sinogram data. The sinogram data is representative of a plurality of sinogram elements. The processor is further configured to reconstruct the measured sinogram data to generate initial reconstructed image data, generate corrected sinogram data using the measured sinogram data and iteratively reconstruct the corrected sinogram data to generate an improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, throughout the iterative reconstruction.

The Examiner indicated that a similar processor was present in Yamada. However, Yamada does not anticipate the system of claims 24 and 27 for at least the reasons set forth below.

Claims 24 and 27 have been amended by this response. The amendments add that the corrected sinogram data is iteratively reconstructed to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, throughout the iterative reconstruction. As discussed with respect to claim 1 above, Yamada does not disclose this aspect.

Because Yamada does not disclose at least these recitations, the reference cannot support a *prima facie* case of anticipation of claims 24 and 27. Accordingly, claims 24 and 27 are believed to be clearly patentable over Yamada as well as other prior art of record.

Claims 25 and 26

Independent claims 25 and 26 were similarly rejected as anticipated by Yamada. Claims 25 and 26 are essentially similar to method claims 1 and 14 respectively, except that they recite a computer-readable medium with code for carrying out such functionality.

Claims 25 and 26 have been amended by this response. The amendment adds that the corrected sinogram data is iteratively reconstructed to generate improved reconstructed image data based on a weight measure associated with each sinogram element, wherein the weight measure corresponds to a function that is inversely proportional to a variance or to a standard deviation of a signal associated with each sinogram element in the measured sinogram data, throughout the iterative reconstruction. As discussed with respect to claim 1 above, Yamada does not disclose this aspect of the invention.

Accordingly, Yamada cannot support a *prima facie* case of anticipation of claims 25 and 26. Accordingly, claims 25 and 26 are believed to be clearly patentable over Yamada as well as other prior art of record.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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